operands and operators by a relative placement of the characters, for displaying the mathematical expressions on the display screen, for performing calculations indicated by the operands and operators in the displayed mathematical expressions, and for displaying a result of the performed calculations on the display screen.

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REMARKS

I. Introduction.

In response to the Office Action of August 9, 1996, claim 26 has been amended. Claims 26-44 remain in the application. Re-examination and re-consideration of the application is requested.

II. Non-Art Rejections.

In paragraphs (4)-(7) of the Office Action, claims 26-44 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

The Applicant has amended claim 26 to overcome this rejection, but respectfully traverses the rejections of the other claims. With regard to the rejections of claims 27-44 relating to the use of the phrase "trace", the Applicant asserts that there is no need nor legal requirement for the phrase to be further defined in the claims. The phrase "trace" is used as a verb in the claims (not a noun) and is grammatically correct. According to Webster's Dictionary, (2d ed. 1988), at p. 1223 thereof, the word "trace" means "to make a ... series of markings

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on a surface." In this instance, the word "trace" relates to the markings made by the stylus on the touch-sensitive screen. Thus, the Applicant asserts that the rejections under 35 U.S.C. § 1.112 are erroneous and should be withdrawn.

III. Prior Art Rejections.

A. The Office Action Rejections.

In paragraphs (8)-(30) of the Office Action, claims 26-44 were rejected under 35 U.S.C. § 103 as being obvious in view of the combination of Inagaki, Guyon, Bonadio, and Iwamura.

The Applicant respectfully traverses these rejections in light of the arguments set forth below.

B. The Applicant's Claimed Invention

The Applicant's invention, as recited in independent claims 26, 27, and 36, comprises a calculator having a display screen covered by a touch sensitive surface and a processing circuit. The processing circuit records movements of a pointing member as the pointing member traces across the touch sensitive surface of the display screen. The processing circuit also recognizes the recorded movements of the pointing member on the touch sensitive surface of the display screen as characters. In addition, the processing circuit recognizes mathematical expressions comprised of operands and operators from a relative placement of the characters. Finally, the processing circuit displays the mathematical expressions on the display screen, performs

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calculations indicated by the operands and operators in the displayed mathematical expressions, and displays a result of the performed calculations on the display screen.

The above-identified combination of elements found in the Applicant's invention are not anticipated nor rendered obvious by the Inagaki, Bonadio, Guyon or Iwamura references. Furthermore, the Inagaki, Bonadio, Guyon and Iwamura references do not teach or suggest the limitations of the independent claims directed to recognizing mathematical expressions comprised of operands and operators from a relative placement of the characters.

C. Comparison of the Cited References to Applicant's Independent Claims 26, 27, and 36

With regard to claim 26, the Office Action states that "the feature of recognizing the mathematical expressions by the relative position is not a conversion of characters into mathematical expressions."

The Applicant traverses this portion of the rejections, which is confusing, incorrect, and misrepresents the plain language of claim 26. Specifically, the relevant part of claim 26 recites elements "for recognizing recorded movements ... as characters, [and] for recognizing ... mathematical expressions comprised of operands and operators by a relative placement of the characters". Contrary to the Office Action's assertion, Applicant's claim 26 is explicitly a conversion of characters into mathematical expressions.

With regard to independent claims 26, 27, and 36, the Office Action states that Inagaki teaches the invention substantially as claimed, but admits that it does not specifically show a processing circuit coupled to a display and a touch sensitive circuit. However, the Office Action states that Guyon discloses a processing circuit coupled to a display and a touch sensitive surface and it would have been obvious to combine Guyon with Inagaki to accomplish the Applicant's invention. The Office Action also admits that Inagaki does not explicitly show the display of one or more mathematical expressions on the display. However, the Office Action states that Bonadio does disclose one or more mathematical equations on a display and it would have been obvious to combine Bonadio with Inagaki to accomplish the Applicant's invention. Further, the Office Action admits that Inagaki does not specifically show the relative placement of characters. However, the Office Action states that Iwamura discloses a system for changing relative positions of displayed characters and it would have been obvious to combine Iwamura and Inagaki to accomplish the Applicant's invention.

The Applicant traverses these rejections. The combination of elements set forth in independent claims 26, 27, and 36 are not anticipated nor rendered obvious by the cited references.

The Inagaki reference discloses a calculator having a display section and separate key array. The calculator uses the key array for recognizing handwriting input, wherein a user runs his finger over the key array in the form of a symbol, and the

calculator recognizes the symbol and enters it as if the corresponding button was pressed. However, the Inagaki reference teaches the entry of digits one at a time.

The Bonadio reference discloses a method and apparatus for providing interactive mathematical manipulation on a computer system. An equation or group of equations is initially typed in by the user on a keyboard, but not through handwritten input, and is then displayed on a separate monitor. Manipulations of the equations previously entered via the keyboard and displayed on the monitor may be affected by using a mouse.

The Guyon reference discloses a neural network for printed and cursive handwritten character recognition. The network records trajectory information about handwritten characters in a memory device for use in a subsequent character recognition without the use of context information. However, the Guyon reference states that character recognition occurs without the use of context information (see column 1, lines 47-59), which suggests that it does not recognize a relative placement of multiple characters.

The Iwamura reference teaches a method of modifying a graphics display image during an editing process, wherein the visual appearance of an item is changed as it is edited, so that there is a clear distinction between the edited and unedited components. In one aspect of Iwamura, the relative positions of the characters displayed within the character cursor are changed, so that the wording of the character cursor reads more clearly.

However, the Iwamura reference teaches nothing about the recognition of mathematical expressions comprised of operands and operators from a relative placement of handwritten characters.

When combined in the manner suggested by the Office Action, the references teach a calculator/computer having a display and separate keyboard or key array. A user could enter symbols through keyboard entry (Bonadio) or handwritten input (Inagaki and Guyon), but only a single character at a time (Inagaki and Guyon), without the use of context information (Guyon), and thus without recognition of the relative placement of symbols (Inagaki and Guyon). The symbols would be displayed on a separate monitor (Inagaki and Bonadio) and the displayed symbols could be manipulated or edited by using a mouse (Bonadio). During the editing process, the relative positions of the symbols displayed within a cursor would be changed, so that the symbols read more clearly (Iwamura), but there is no recognition of mathematical expressions comprised of operands and operators from a relative placement of handwritten characters. In light of the above, the Applicant asserts that the combined references do not teach or suggest all the elements of the Applicant's independent claims 26, 27, and 36.

Apart from these differences, there is no basis for combining or modifying the references in the manner suggested by the Office Action to disclose the inventions as set out in Applicant's independent claims 26, 27, and 36. It would only be with hindsight for the Office Action to maintain that such a

combination or modification could be made and that the relationships between elements recited in the Applicant's claims are obvious. Indeed, the large number of references that must be combined in the Office Action rejections supports the Applicant's claim of patentability. Thus, the Applicant assert that the rejections of claims 26, 27, and 36 should be withdrawn.

The Applicant was the first to conceive of the inventive concept set out in independent claims 26, 27, and 36, and as such, the Applicant has achieved a significant advance in the field of calculators and computers.

G. Comparison of the Cited References to Applicant's Dependent Claims 28-35 and 37-44

With regard to claims 28 and 37, the Office Action cites Bonadio as recognizing a number of digits as a single number.

The Applicant traverses these rejections. Bonadio teaches the entry of numbers via a keyboard, but not through handwritten input. As a result, Bonadio does not teach or suggest recognizing numbers from a relative placement of the handwritten digits, so that when the digits are traced horizontally in close proximity to one another on the touch sensitive surface of a display screen, they are considered to be a single number. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 29 and 38, the Office Action cites Bonadio as recognizing mathematical expressions horizontally and vertically.

The Applicant traverses these rejections. Bonadio teaches the entry of numbers via the keyboard, but not through handwritten input. As a result, Bonadio does not teach or suggest recognizing mathematical expressions traced horizontally and vertically on the touch sensitive surface of a display screen. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 30 and 39, the Office Action cites Inagaki as disclosing the tracing of a result operator.

The Applicant traverses these rejections. Inagaki teaches the calculation of a formula when the CAL key is actuated after the formula is written, but not through the tracing of a result operator on the touch sensitive surface of a display screen. Therefore, Inagaki does not teach or suggest the Applicant's invention.

With regard to claims 31 and 40, the Office Action cites Bonadio as animating mathematical expressions.

The Applicant traverses these rejections. Bonadio teaches the animation of a user action on the screen as a mouse button is depressed and the animation of a graph, but not the animation of expressions on the display screen as they are being calculated. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 32 and 41, the Office Action cites Bonadio as correcting mathematical expressions.

The Applicant traverses these rejections. Bonadio teaches the manipulation of equations using a mouse, but not the step of accepting of corrections in the mathematical expressions, wherein the corrections are traced on the touch sensitive surface of a display screen. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 33 and 42, the Office Action cites Bonadio as annotating and labelling recognized movements.

The Applicant traverses these rejections. Bonadio teaches the labeling of equations to identify the source of an equation, but not the step of accepting of marks traced on the touch sensitive surface of a display screen to annotate and label the recorded movements. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 34 and 43, the Office Action cites Bonadio as accepting insertions of mathematical expression.

The Applicant traverses these rejections. Bonadio teaches insertion into mathematical expressions using a mouse, but not the step of accepting of insertions in the mathematical expressions, wherein the insertions are traced on the touch sensitive surface of a display screen. Therefore, Bonadio does not teach or suggest the Applicant's invention.

With regard to claims 35 and 44, the Office Action cites Bonadio as being capable of performing deletions of mathematical expressions.

The Applicant traverses these rejections. Bonadio teaches deletion from mathematical expressions using a mouse, but not the step of accepting of deletions in the mathematical expressions, wherein the deletions are traced on the touch sensitive surface of a display screen. Therefore, Bonadio does not teach or suggest the Applicant's invention.

IV. Information Disclosure Statement

In paragraph (31), the Office Action requests publication dates for a number of references cited on a PTO-1449 form filed by the Applicant on May 22, 1995. The Applicant would like to comply with this request, but unfortunately has no such information. These references were provided by the Applicant in the interests of full disclosure under 37 C.F.R. § 1.56, notwithstanding the Applicant's lack of knowledge concerning publication dates. The Applicant respectfully requests that the Office use its resources to determine the publication dates or find relevant similar disclosures.

VI. Conclusion.

In view of the amendments and arguments, it is requested that the rejections under 35 U.S.C. §§ 102, 103 and 112 be withdrawn. The Applicant respectfully submits that this

application is now in good order for allowance and such action is solicited.

Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, he is urged to call the below-signed attorney.

Respectfully submitted,

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Dated: Nov. 8, 1996

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on
November 8, 1996
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(Printed Name)

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(Signature)